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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,178	03/25/2004	Hiroshi Shingai	890050.476	7760
500	7590	11/17/2006	EXAMINER VERDERAME, ANNA L	
SEED INTELLECTUAL PROPERTY LAW GROUP PLLC 701 FIFTH AVE SUITE 5400 SEATTLE, WA 98104			ART UNIT 1756	PAPER NUMBER

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/809,178

Applicant(s)

SHINGAI ET AL.

Examiner

Anna L. Verderame

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date March 25, 2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 5,7, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Shingai *et al.* '166.

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Shingai *et al.* '166 teaches an optical recording medium manufactured using polycarbonate discs as a substrate and successively forming an AgPdCu reflective layer, a second dielectric layer, a recording layer, a first dielectric layer, a heat sink layer, and a light-transmitting layer on a surface thereof. The second dielectric layer was formed of ZnS(50 mol%)-SiO<sub>2</sub>(50 mol%) to a thickness of 4nm. On top of the second dielectric layer was formed a recording layer of Sb,Mn,Te,Ge, and In with the composition of each recording layer being changed by changing the amount of Mn in each optical recording medium. The composition of the recording layer in this embodiment was set as (In<sub>0.9</sub>Sb<sub>75.7</sub>Te<sub>17.5</sub>Ge<sub>5.9</sub>) and the amount of added manganese was Mn<sub>x</sub> where X=9.3 or 18.7(atomic %). The thickness of the recording layer in this example was 14nm. A second dielectric layer was formed on top of the recording layer. Next, a heat sink layer composed of AlN was formed on top of this first dielectric layer to a thickness of 100nm [00046],[0033-0035].

This reference teaches the addition of a heat radiation layer placed opposite the reflecting layer. It also teaches the placement of a dielectric layer on either side of the recording layer. The thickness of 4nm for the second dielectric layer is embraced by the range of 3nm to 16nm claimed in this application. Also, the claims regarding the composition of the phase change recording material are met by this reference. The presence of In to the phase change recording composition taught in this reference is not precluded by the claims of this application.

4. Claims 1-7, 10 and 13 are rejected under 35 U.S.C. 103(a) as being obvious over Kato *et al.* '805.

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing

that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Kato *et al.* '805 teaches the fabrication of an optical recording medium comprising a reflective layer consisting of an alloy of Ag, Pd and Cu and having a thickness of 100 nm, a second dielectric layer consisting of a mixture of ZnS and SiO<sub>2</sub> and having a thickness of 12nm, a recording layer consisting of Ge<sub>0.06</sub>Sb<sub>0.76</sub>Te<sub>0.18</sub> and having a thickness of 12nm, a first dielectric layer consisting of the mixture ZnS and SiO<sub>2</sub> and having a thickness of 30 nm and a heat radiation layer containing 90 atomic % or more of aluminum nitride and having a thickness of 100nm[0094]. The reference also discloses rotating the disc at a linear velocity of 10.5m/sec, thereby recording random signals including 2T signals to 8T signals in the 1,7 RLL Modulation Code[0101]. Kato *et al.* '805 also teaches a phase change recording material represented by the general formula (Sb<sub>x</sub>Te<sub>+x</sub>)<sub>1-y</sub>M<sub>y</sub> where M is an element other than Sb and Te, x is equal to or larger than .55 and equal to or smaller than .99, and y is equal to or larger than 0 and equal to or smaller than .25. Preferably, x is equal to or larger than .65 and equal to or smaller than .85 and y is equal to or larger than 0 and equal to or smaller than .25. M is further defined to be one or more elements selected from the group consisting of In, Ag, Au, Bi, Se, Al, P, Ge, H, Si, C, V, W, Ta, Zn, Mn, Ti, Sn, Pd, Pb, N, O and rare earth elements. It is preferable to use one or more elements selected from the group consisting of In, Ag, Ge, and rare earth metals and it is most preferable to use Ge, Tb, or Ge, and Mn as the element M[0063-0067,0026,0031]. Finally, Kato *et al.* '805 teaches a motivation for the addition of Mn and Ge to the phase change

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material. When Ge and Mn are employed as M the crystallization velocity of the phase change material can be further increased and the crystallization temperature of the phase change material can be increased. It is also possible to improve the overwriting characteristics and reduce jitter. As a result the track pitch can be set narrower and data can be recorded in the optical recording medium at a higher density(0031-0032).

It would have been obvious to one of ordinary skill in the art to add Mn and Ge, in a total amount of 7 to 25% with Mn being 5-23 and Ge being 2-10 based upon disclosure to add these together and y being up to 25%, to the phase change material of example 1, containing both an Ag reflective and an AlN heat dissipative layer, with the expectation of forming a medium with a high linear recording velocity, reduced jitter, and improved overwriting characteristics. The recording mark for 2T meets the requirements of claim 6. The claim does not require this pulse train pattern be used for all pulses.

5. Claims 1-7 10,13, and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato *et al.* '805 in view of Koide US 6,704,273.

Koide '273 teaches the use of a wobble signal. A wobble signal is a signal that represents a data previously set for each optical disk. In this embodiment, wobble of a guide groove is modulated so that the wobble signal indicates optimal conditions for recording data on and optical disk with an address signal (ID signal) or a laser beam, namely an optimal recording pulse strategy, an optimal laser power, a media attribute(that is, A type of the optical disk) of the like. The optical recording medium in

this example contains a phase-change recording layer from a four-element material consisting of silver, indium, antimony, and tellurium (4/7-19). The PCA and PMA are disclosed(5/39-6/1). The drawing on the first page of this application shows that this lead in area is not in the Data-write area of the disk.

Kato *et al.* '805 teaches the use of 2T signals to 8T signals in the 1,7 RLL Modulation Code in an optical recording medium containing the correct ordering of layers specified in this application.

It would have been obvious to one of ordinary skill in the art to add a lead-in area that contained information to ID the medium and testing areas which allow determination of optimal conditions and recording of optimal recording settings as taught by Koide '273 to the medium of Kato *et al* '805 with the expectation of forming an optical recording medium that could be recorded using recording conditions specifically tuned to that medium. This addition would allow information relating to the medium, including information on optimal recording conditions, to be physically conveyed with the disc.

6. Claims 1-5 7,10,and 13 are rejected under 35 U.S.C. 103(a) as being obvious over Hosoda *et al.* '772 in view of Ichijo *et al.* '458 and Nishihara *et al* '281. .

Hosoda *et al.* '772 teaches the manufacture of an optical recording medium comprising a reflective layer, a second dielectric layer, a phase change recording layer, a first dielectric layer, and a heat dissipative layer. The reflective layer consisting of an Ag-Pd-Cu alloy was formed on a polycarbonate substrate to a thickness of 100nm.



Then there was deposited ZnS-SiO<sub>2</sub> to thereby form the second dielectric layer having a film thickness of 6nm. Next, there was deposited a quaternary alloy of Ge-In-Sb-Te, to thereby obtain the phase change recording layer having a film thickness of 16 nm. Further, there was deposited ZnS-SiO<sub>2</sub> to form the first dielectric layer. In addition there was deposited AlN to thereby form the hardness enhancing layer having a thickness of 5nm followed by deposition of ZnS-SiO<sub>2</sub> identically with the first and second dielectric layer to form the protecting layer having a film thickness of 25nm. Finally, a polycarbonate resin sheet was adhered onto the final dielectric layer(0071). The examiner holds that the AlN layer, in this example, also acts as a heat dissipation layer. The phase recording composition in this example does not contain Mn. However, the recording layer is not limited to GeSbTe[0049].

Ichijo *et al.* '458 the addition of Mn to a recording layer containing Ge, Sb, and Te. When the contents of the respective atoms are 10-30 atom % of Ge, 10-30 atom % of Sb, and 40-80 atom % of Te, or 35-65 atom % of Ge, 10-30 atom % of Sb, and 35-65 atom % of Te a phase change between the amorphous phase and the crystalline phase can be easily carried out so that a rewrite of the information is easy. By adding at least one of Au, Cu, Pd, Ta, W, Ir, Sc, Y, Ti, Zr, V, Nb, Cr, Mo, Mn, Fe, Ru, Co, Rh, Co, Ni, Ag, Tl, S, Se, Pt, and N of 1-10 atom %, the temperature for crystallization of the amorphous state is increased or the activation energy is increased (0012).

Nishihara *et al.* '281 teaches a first recording layer formed of a material represented by the composition formula  $(\text{Ge}_a\text{Sb}_b\text{Te}_{3+a})_{100-c}\text{M}_3\text{c}$ . In this composition M<sub>3</sub> can be manganese in amounts of 0-20%. The addition of Mn increases the melting

point and the crystallization temperature of the recording layer, so that the thermal stability of the recording layer can be improved [0071].

It would have been obvious to one of ordinary skill in the art to add Mn in amounts of 5-20% to the phase change recording composition, of the cited example of Hosada *et al* containing both a reflective and a heat dissipative layer, with the expectation of forming a functional optical recording medium with a higher crystallization temperature which increases stability as taught by Ichijo *et al* '458 and Nishihara *et al* '281. Further, it would have been obvious to use thicknesses of 10-15 nm for the dielectric layer adjacent to the reflective layer in the resulting medium based upon the range of 10-40 taught by Oomachi *et al* '908.

7. Claims 1-5, 7, 10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oomachi *et al* '908 in view of Ichijo *et al* '458 and Nishihara *et al* '281.

Oomachi *et al* '908 teaches the fabrication of an optical recording medium comprising a polycarbonate substrate, a dielectric layer, a second dielectric layer, a recording layer, a third dielectric layer and a reflective layer. The first dielectric layer is made of AlN layer having a thickness of 10-30 nm. The second dielectric is made of a ZnS-SiO<sub>2</sub> layer having a thickness of 10-30nm. The phase change recording layer is made of GeSb<sub>4</sub>Bi<sub>4</sub>Te<sub>52</sub> layer having a thickness of 10-20nm. The third dielectric layer is made of ZnS-SiO<sub>2</sub> layer having a thickness of 10-40nm. The reflecting layer is made of an AdPdCu layer having a thickness of 50-200nm. After that a substrate made of

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polycarbonate is bonded via the UV curing layer(0080). The examiner holds that the AlN layer in this example also dissipates heat generated by the recording layer of this medium.

It would have been obvious to one of ordinary skill in the art to add Mn in amounts of 5-20% to the phase change recording composition, of the cited example Oomachi *et al.* '908, containing both a reflective and a heat dissipative layer, with the expectation of forming a functional optical recording medium with a higher crystallization temperature which increases stability as taught by Ichijo *et al.* '458 and Nishihara *et al.* '281. Further, it would have been obvious to use the thicknesses of 10-16nm for the dielectric layer adjacent to the reflective layer in the resulting medium based upon the range taught by Oomachi *et al.* '908.

8. Claims 1,2,7, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroda *et al.* '224 and further in view of Ichijo *et al.* '458 and Nishihara *et al.* '281.

Kuroda *et al.* '224 teaches an optical recording medium comprising a heat radiating layer, the first dielectric layer, the recording layer, the second dielectric layer, and the reflective layer. An aluminum alloy is used to form a reflective layer of a thickness of 120nm. As the second dielectric layer a ZnS-SiO<sub>2</sub> layer having a refractive index of  $n=2$  and a thickness of 20nm is used. As the recording layer a Ge-Sb-Te layer having a refractive index  $n=3.9$  and a thickness of 20nm is used. As the first dielectric layer a ZnS-SiO<sub>2</sub> layer having a thickness of 50 nm is used. Finally, as the heat

dissipating layer an AlN layer having a thickness of 50nm is used. Two polycarbonate substrates were used to form the bases on which these layers were formed.

Therefore it would have been obvious to one of ordinary skill in the art to add Mn in amounts of 5-20% to the phase change recording composition, of the cited example Kuroda *et al.* '224, containing both a reflective and a heat dissipative layer, with the expectation of forming a functional optical recording medium with a higher crystallization temperature which increases stability as taught by Ichijo *et al.* '458 and Nishihara *et al.* '281.

9. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Hosoda *et al.* '772, Oomachi *et al.* '908, or Kuroda *et al.* '224 combined with Ichijo *et al.* '458 and Nishihara *et al.* '281 and further in view of Koide '273 *et al.* and Harigaya *et al.* (EP1260973).

Harigaya *et al.* teaches the manufacture of an optical recording medium. Using a polycarbonate substrate a recording medium was produced by laminating each later thereon by sputtering. First a lower protection layer 68nm in film thickness was formed first by use of a ZnS:SiO<sub>2</sub>=80:20(mol%). Next a phase-change recording layer 16nm in film thickness was formed by use of alloy targets. The basic composition of such recording layer is any one of GeMnSbTe, GeGaMnSbTe, and GeSnMnSbTe. Table 1 of this reference shows the amounts of each element contained in the composition. The examples of this reference that meet the %Mn requirement of the claims are examples 1-3 and 7-15 which teach 5-7% Mn. These examples show Sb enriched

compositions containing the correct amount of Mn. Then, each upper protection layer 10nm in film thickness was formed using the same target of  $\text{ZnS}:\text{SiO}_2=80:20(\text{mol}\%)$  as in the lower protection layer(examples 1-12). Further medium provided with an upper protection layer 10nm in film thickness was separately formed using mixture target  $\text{ZnS}:\text{ZrO}_2:\text{Y}_2\text{O}_3:\text{SiO}_2=62:20:3:15$ (examples 13-15). Each second upper protection layer 4nm in film thickness having compositions shown in Table 1 was then formed. Then, a reflection layer 140nm in film thickness was formed of Ag or AgCuNi alloy. Finally, a protection film was formed of a UV curable resin and a polycarbonate substrate was adhered thereupon(0143-0151). This reference does not teach the use of a heat dissipation layer above the first dielectric layer and on the opposite side from the reflective layer. The lower protection layer may be 20-100nm[0077]. Harigaya *et al.* (EP 1 260 973 A2) also teaches a specific recording velocity of 17.5 m/s(0152).

The Harigaya reference further teaches the recording of recording data by 8-16 modulation at a recording power of 19mW, a bias power of .1mW , an erasing power of 6mW, and a pulse sequence in figure 5. The ratio of  $P_e/P_w$  was .315(0152).

In addition to the basis above it would have been obvious to one skilled in the art to modify the combination of either Hosada *et al.*, Oomachi *et al.*, or Kuroda *et al.* with Ichijo *et al* and Nishihara *et al* by adding a lead in area including ID info and a testing area to determine the optimal exposure conditions taught by Koide *et al.* to have this conveyed with the medium and to use the exposure conditions and pulse sequences of Harigaya *et al.* with a reasonable expectation of forming a useful optical recording medium.

10. Claims 1-3, and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harigaya *et al.* (EP 1 260 973 A2) in view of Nagata *et al.* (EP 1 052 632 A2) in view of Mizushima *et al.* [(WO 03/098619)2006/0072436 is English equivalent].

Mizushima *et al.* teaches an optical recording medium comprising a phase change recording composition containing manganese, and an AlN heat radiation film. First, a reflective film containing AgPdCu and having a thickness of 100nm was formed on the surface of the polycarbonate substrate. The silver alloy contained 98 atomic % of Ag, 1 atomic % of Pd and 1 atomic % of Cu. Further, a dielectric film containing a mixture of ZnS and SiO<sub>2</sub> and having a thickness of 15nm was formed on the surface of the reflective film by sputtering. Then, a recording film containing SbTeGe and having a thickness of 12nm was formed on the surface of the dielectric film. Further, a dielectric film containing a mixture of ZnS and SiO<sub>2</sub> and having a thickness of 55nm was formed on the surface of the recording film. Both dielectric layers contained 80 mol % ZnS and 20 mol % SiO<sub>2</sub>. Further, a transparent heat radiation film consisting of AlN and having a thickness of 48 nm was formed on the dielectric film(WO(2111-22)/US[0129-0135]).

Mizushima *et al.* teaches the addition of Mn to the phase change recording composition. Concretely, it is preferable to form the recording system of a SbTe system material represented by the compositional formula (Sb<sub>x</sub>Te<sub>1-x</sub>)<sub>1-y</sub>-M<sub>y</sub> where M is an element other than Sb and Te, x is equal to or larger than .55 and equal to or smaller than .9 and y is equal to or larger than 0 and equal to or smaller than .25, and it is more preferable to form the recording film of SbTe system material represented by the above mentioned compositional formula wherein x is equal to or larger than .65 and equal to or

smaller than .85 and  $y$  is equal to or larger than 0 and equal to or smaller than .25.

Also while  $M$  is not particularly limited it is preferable for the element to be one or more elements selected from the group consisting of In, Ag, Au, Bi, Se, Al, P, Ge, H, Si, C, V, W, Ta, Zn, Mn, Ti, Sn, Pd, N, O and rare earth elements(WO(9/14-10/6)/US[0062-0063]).

Finally, Mizushima *et al.* teaches specifications for the heat radiation film. The transparent heat radiation film serves to increase the heat radiation characteristic of the recording layer. The transparent heat radiation film can be formed of the material used in forming the first dielectric layer or the like but it is necessary to form the transparent heat radiation layer of a material having a higher conductivity than that used to form the second dielectric layer. Therefore, in the case in the case where the first dielectric film and the transparent heat radiation film are formed of a material selected from a group consisting of AlN, SiC, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, and ZnS:SiO<sub>2</sub>, for example the thermal conductivities of AlN and SiC are the highest, the thermal conductivities of Al<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub> are the second highest and ZnS:SiO<sub>2</sub> is lowest, although they depend upon film forming conditions, when the first dielectric film is formed of ZnS:SiO<sub>2</sub> it is necessary to form the heat radiation film of any of the other materials. AlN is the most preferable material for forming the heat radiation film. Further, It is preferable to form the heat radiation film to a thickness of 10-100nm. In the case where the heat radiation film has a thickness less than 10nm it is impossible to increase the heat radiation characteristics of the recording layer, and on the other hand when the heat radiation film has a thickness larger than 200nm a long time is required to form the layer thereby lowering

the productivity of the optical recording medium and the heat radiation film becomes somewhat susceptible to cracking due to internal stress(WO(14/5-16)/US[0087-0088]).

Nagata *et al.* (EP 1 052 632 A2) teaches a motivation for the use of a heat dissipation layer and for the specific placement of a dielectric layer between the recording layer and the heat dissipation layer. The heat dissipation layer, made of a material of high thermal conductivity, is not placed adjacent to the recording layer because it decreases the sensitivity of the recording layer. This is believed to be because the recording layer, when irradiated with laser light, is prevented from being heated because of rapid release of heat through the protective layers so that the temperature of the recording layer material does not reach the temperature necessary for recording. The recording layer is also not able to hold onto the heat long enough to record a mark. On the other hand, after the recording layer material reaches a sufficiently high temperature by irradiation of laser light and becomes molten, the larger level of heat release from the recording layer is more desirable. In order to optimize the retention of heat in the recording layer and the release of heat from the recording layer to avoid unnecessarily heating the recording layer the dielectric layer having better heat retention properties is placed adjacent to the recording layer and the heat dissipation having greater heat conductivity is placed above this dielectric layer. The thickness of the heat dissipation and dielectric layers can be adjusted to achieve the level of heat removal desired(0047-0052). Materials including  $AlN_x$  have all of the desired properties required when forming a heat dissipation layer(0032).



Therefore it would have been obvious to one of ordinary skill in the art to add a heat dissipation layer to the media of examples 13-15 of Harigaya *et al.*, adjacent to the first dielectric layer and opposite the reflective layer, to the optical recording medium with a phase-change recording composition that contained Mn with the expectation of forming a functional medium. It would have also been obvious to use the pulse sequence shown in figure 5 of EP 1 260 973 A2 when recording. Further, it would have been obvious to use 11-20% amounts of Mn based upon disclosure in Harigaya *et al.* in view of Nagata *et al.* (EP 1 052 632 A2) and Mizushima *et al.* (WO 03/098619).

11. Claims 1-3, 5,7,8,9, and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harigaya *et al.* (EP 1 260 973 A2) further in view of Koide US 6,704,273, Nagata *et al.* (EP 1052632), and Mizushima *et al.* (WO/03/098619).

Harigaya *et al.* (EP 1 260 973 A2) teaches the recording of recording data by 8-16 modulation at a recording power of 19mW, a bias power of .1mW and an erasing power of 6mW. The ratio of  $P_e/P_w$  was .315(0152). It does not teach the writing of optimal recording conditions into the recording medium.

Harigaya *et al.* (EP 1 260 973 A2) also teaches a specific recording velocity of 17.5 m/s (0152).

Koide teaches the use of a wobble signal. A wobble signal is a signal that represents a data previously set for each optical disk. In this embodiment, wobble of a guide groove is modulated so that the wobble signal indicates optimal conditions for recording data on and optical disk with an address signal (ID signal) or a laser beam,

namely an optimal recording pulse strategy, an optimal laser power, a media attribute(that is, A type of the optical disk) of the like. The optical recording medium in this example contains a phase-change recording layer from a four-element material consisting of silver, indium, antimony, and tellurium (4/7-19).

It would have been obvious to one of ordinary skill in the art to add a lead-in area that contained information on optimal recording settings and a testing area to the media, resulting from the combination of Harigaya *et al.* (EP 1 260 973 A2), Nagata *et al.* (EP 1052632), and Mizushima *et al.* (WO/03/098619), with the expectation of forming an optical recording medium that could be recorded using recording conditions specifically tuned to that medium and thus gain the advantage of Koide *et al.* '273. This addition would allow maximum information to be held on the Data-write area of the disk and would allow for information on optimal recording conditions to be conveyed.

### ***Double Patenting***

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

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be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

13. Claims 1-5, 7-10, and 12-16 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of copending Application No.10/824,081(US 2004/0208105). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claimed optical recording medium is the same and the ranges claimed for the recording layer composition and the  $P_e/P_w$  ratio overlap with those claimed in this application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 1 of the copending application 10/824,081 teaches a phase-change recording composition  $Sb_aTe_bGe_cMn_d$  where a is equal to or larger to 55 and smaller than 70, c is equal to or larger than 4 and equal to or smaller than 10, d is equal to or larger than 10 and equal to or smaller than 20, a/b is equal to or larger than 2.8 and equal to or smaller than 3.5 and a/d is equal to or larger than 3.0 and equal to or smaller than 6.0, in an amount of more than 95% atomic. These ranges are embraced by the ranges, where a is equal to or larger than 57 and equal to or smaller than 74, c is equal to or larger than 2 and equal to or smaller than 10, d is equal to or larger than 5 and equal to or smaller than 2, a/b is equal to or larger than 2.9 and smaller than 4.7 in an amount equal to or more than 95 atomic %, in claim one of this application.

Claim 2 of this application and copending application 10/824,081 are identical.

Claim three of the copending application 10/824,081 further specifies that the heat radiation layer contain more than 90% AlN.

Claim 4 of copending application 10/824,081 is identical to claim 3 of this application.

Claim 5 of copending application 10/824,081 combines claims 1-3 of this application.

Claim 6 of copending application 10/824,081 is identical to claim 4 of this application.

Claim 7 of copending application 10/824,081 is identical to claim 5 of this application.

Claim 8 of copending application 10/824,081 is a combination of claims 7 and 8 of this application.

Claim 8 of the copending application teaches a phase-change recording composition  $\text{Sb}_a\text{Te}_b\text{Ge}_c\text{Mn}_d$  where a is equal to or larger to 55 and smaller than 70, c is equal to or larger than 4 and equal to or smaller than 10, d is equal to or larger than 10 and equal to or smaller than 20, a/b is equal to or larger than 2.8 and equal to or smaller than 3.5 and a/d is equal to or larger than 3.0 and equal to or smaller than 6.0. The claim also teaches a linear recording velocity higher than 14 m/s and lower than 21 m/s.

These ranges for the recording composition are embraced by the ranges, where a is equal to or larger than 58 and equal to or smaller than 74, c is equal to or larger than 2 and equal to or smaller than 10, d is equal to or larger than 5 and equal to or

smaller than 16,  $a/b$  is equal to or larger than 2.9 and smaller than 4.5, taught in claim 7 of this application.

The recording velocities are identical to the range of 14-21 m/s taught in claim 8 of this application.

Claim 9 of copending application 10/824,081 is a combination of claims 10 and 8 of this application.

Claim 9 of the copending application teaches a phase-change recording composition  $Sb_aTe_bGe_cMn_d$  where  $a$  is equal to or larger to 55 and smaller than 70,  $c$  is equal to or larger than 4 and equal to or smaller than 10,  $d$  is equal to or larger than 10 and equal to or smaller than 20,  $a/b$  is equal to or larger than 2.8 and equal to or smaller than 3.5 and  $a/d$  is equal to or larger than 3.0 and equal to or smaller than 6.0. The claim also teaches a linear recording velocity higher than 14 m/s and lower than 21 m/s.

These ranges for the recording composition are embraced by the ranges, where  $a$  is equal to or larger than 57 and equal to or smaller than 70,  $c$  is equal to or larger than 2 and equal to or smaller than 10,  $d$  is equal to or larger than 11 and equal to or smaller than 20,  $a/b$  is equal to or larger than 3.3 and smaller than 4.7, taught in claim 10 of this application.

The recording velocities are identical to the range or 14-21m/s taught in claim 8 of this application.

Claim 10 of copending application 10/824,081 is a combination of claims 13 and 8 of this application.

Claim 10 of the copending application teaches a phase-change recording composition  $\text{Sb}_a\text{Te}_b\text{Ge}_c\text{Mn}_d$  where a is equal to or larger to 55 and smaller than 70, c is equal to or larger than 4 and equal to or smaller than 10, d is equal to or larger than 10 and equal to or smaller than 20, a/b is equal to or larger than 2.8 and equal to or smaller than 3.5 and a/d is equal to or larger than 3.0 and equal to or smaller than 6.0. The claim also teaches a linear recording velocity higher than 14 m/s and lower than 21 m/s.

These ranges for the recording composition are embraced by the ranges, where a is equal to or larger than 57 and equal to or smaller than 70, c is equal to or larger than 2 and equal to or smaller than 10, d is equal to or larger than 11 and equal to or smaller than 20, a/b is equal to or larger than 3.3 and smaller than 4.7, taught in claim 13 of this application.

The recording velocities are identical to the range or 14-21m/s taught in claim 8 of this application.

Claim 11 of copending application 10/824,081 teaches a range of 0.3-0.7 for the ratio  $P_e/P_w$ . This range is embraced by the range of 0.26-0.47 claimed in claim 12 of this application.

Claim 12 of copending application 10/824,081 claims a range of 0.3-0.7 for the ratio  $P_e/P_w$ . The claim is dependent on claim 9 which teaches a linear recording velocity of 14-21m/s. This range embraces the range taught in claim 15 of this application. Claim 15 of this application is dependent on claim 14 which teaches a linear recording velocity of 14-33m/s which embraces the range of 14-21 m/s taught in the copending application.

Claim 13 teaches a range of 0.3-0.7 for the ratio  $P_e/P_w$ . This claim depends on claim 9 which teaches a linear recording velocity of 14-21 m/s. This range is partially embraced by the range of 0.26-0.51 taught in claim 15 of this application. Claim 15 of this application is dependent upon claim 14 which teaches a linear recording velocity of 14-21 m/s.

Claim 14 of copending application 10/824,081 is identical to claim 16 of this application.

Claim 15 of copending application 10/824,081 is a combination of claims 1,2 and 16 of this application.

Claim 16 of copending application 10/824,081 is a combination of claims 1, 3 and 16 of this application.

It would have been obvious to one skilled in the art to use the composition  $Sb_{55-70}Te_{[2.8-3.5(55-70)]}Ge_{4-10}Mn_{10-20}$  in the recording layer of the medium taught in this application with a reasonable expectation of forming a useful optical recoding medium. This is because there is significant overlap between the ranges taught in this application and the copending application 10/824,081. Further, It would have been obvious to use a ratio  $P_e/P_w$  of an erasing power of a laser beam  $P_e$  to a recording power  $P_w$ , equal to or larger than .3 and equal to or smaller to .7 with the reasonable expectation of successfully recording data into the recording layer of the optical recording medium described in this application. This is because there is significant overlap in the ranges of .27-.51 and .26-.47 claimed in this application and the range of .3-.7 claimed in copending application 10/824,081.

14. Claims 1-5,7,10, and 13 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. 10/756,036(US 2004/0146805). Although the conflicting claims are not identical, they are not patentably distinct from each other because they claim the product but do not specify recording conditions, including pulse sequences, and  $P_e/P_w$  ratio, linear recording velocity, or a lead-in area, or a data recording apparatus comprising means for reading the data held in the lead-in area.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 1 of copending application claims an optical recording medium comprising a recording layer, a first dielectric layer disposed on the side of a light incidence plane, a second dielectric layer disposed on the opposite side to the light incidence plane with respect to the recording layer, a heat radiation layer disposed on the side of the light incidence plane with respect to the first dielectric layer and a reflective layer disposed on the side opposite to the light incidence plane with respect to the second dielectric layer. This is the specific order taught in this application.

The recording layer contains a phase-change recording material represented by the general formula:  $(Sb_xTe_{1-x})_yM_y$  where M is an element other than Te. Claim 5 of the copending application further specifies that M can be Ge and Tb or Ge and Mn.

The reflecting layer is specified as containing 90 atomic % or more of Ag. This is what is claimed in claim 3 of this application.



The heat radiation layer is specified as containing 90 atomic % or more AlN. This is what is claimed in claim 2 of this application.

Claims 7-10 of copending application 10/756,036 teaches the use of varying proportions of ZnS and SiO<sub>2</sub> in the dielectric layers of the medium. This is discussed in the specifications of this application.

It would have been obvious to one skilled in the art to use (Sb<sub>.65-.74</sub>Te<sub>.26-.35</sub>)<sub>.9-.75</sub>(M<sub>.1-.25</sub>) where M is 75%Mn and 25%Ge based upon values of x and y and M being preferably Ge and Mn which overlap with those cited in the claims of the application.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna L. Verderame whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8:30A-4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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